“COMPARATIVE STUDY OF ORGANIC AND CONVENTIONAL FARMING WITH REFERENCE TO WHEAT(HD-2189) AND GROUNDNUT (TAG 24)”

स्वामी रामानंद तीर्थ
मराठवाडा विद्यापीठ, नांदेड

A

Synopsis submitted to

Swami Ramanand Teerth Marathwada university,Nanded.

For the degree of

Doctor of philosophy in Botany

Under the faculty of science

By

Mrs.BHOSLE SHAILAJA BHAGWANRAO

Under the Guidance of

Dr. MUKUNDRAJ B. PATIL

Head, Department of Botany
Late Ramesh Warpudkar college Sonpeth

July -2021

COMPARATIVE STUDY OF ORGANIC AND CONVENTIONAL FARMING WITH REFERENCE TO WHEAT (HD-2189) AND GROUNDNUT (TAG 24).

INTRODUCTION - Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with 82% of farmers being small and marginal. In 2017-18, total food grain production was estimated at 275 million tonnes. Till World War II agriculture in the world was organic thereafter flow of chemicals in the agriculture was increased in the form of fertilizers, pesticides, herbicides etc. Due to increased yield, it became most popular without knowing its drawbacks. During 1980s a movement called biological agriculture began under the ward ship of Hans Peter Rusch and Hans Muller in Switzerland (Le Guillou and Scharpe, 2001). This movement led foundation to the organic farming in the world. Organic farming can be defined in various ways -

According to the USDA "organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc.) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection".

According to FAO "Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs".

In India Green revolution during 1950s to 60s increased yield. Similarly, there was recommendation to use different chemicals like fertilizers, pesticides, weedicides etc. Though these chemicals are useful to increase yield but due to unawareness among the farmers about use

of these chemicals there is excess use of chemicals which is entered in the ecosystem. These chemicals are causing harmful impact on the human being. Traces also recorded in the mother's milk which indicates the seriousness of the topic. Export of fruits and flowers from India is badly affected due to detection of traces of chemicals in it.

Higher percentage of cancer patients from Punjab state which ranks at top in the use of agrochemicals. It is clearly indicated impact of excess use of agrochemicals on human health. Beside carcinogenic nature of agrochemicals it also shows gastrointestinal, mental and irritating impact on the human being.

It also effects on the Flora and Fauna in the soil as well as in the surrounding water bodies. 'Atrazine' are of the chemical herbicide used in conventional farming has caused hermaphroditic condition in frogs exposed to it (Hayes, 2002). As conventional farming has many drawbacks regarding the health and environmental issues hence there is need to change the way of farming and organic farming is the best substitute for this.

Though Sikkim was declared India's first organic state in 2016 for adopting organic farming in a big way, In India organic farming is in a nascent stage. According to the Union Ministry of Agriculture and Farmers' Welfare about 2.78 million hectare of farmland was under organic cultivation as of March 2020. This is 2% of the net sown area in the country (140.1 million ha).

Out of 140.1 million ha, 1.94 million ha is under National Programme for Organic Production (NPOP); 0.59 million ha under Paramparagat Krishi Vikas Yojna (PKVY); 0.07 million ha under Mission Organic Value Chain Development for North Eastern Regions (MOVCDNER) and 0.17 million ha under state schemes or non-schemes. This shows farmers are not self-motivated for the organic farming. Therefore, more efforts should be made to change attitude of the farmers.

Though organic farming this term is well known to us very little work is carried in this field and most of the work is related with economics, history and statistical based. Therefore, this topic 'Comparative study of organic and conventional farming' is selected for research work.

REVIEW OF LITERATURE

Pandey and Singh (2012) studied Opportunities and constraints in organic farming: An Indian perspective and concluded that Farmer's apprehension towards organic farming in India is rooted in non- availability of sufficient organic supplements, bio fertilizers and local market for organic produce and poor access to guidelines, certification and input costs. Capital-driven regulation by contracting firms further discourages small farm holders. An integrated effort is needed from government and nongovernment agencies to encourage farmers to adopt organic farming as a solution to climate change, health and sustainability issue.

Meena *et al.*, (2013) studied Organic farming and components and concluded that organic farming is kind of agricultural that provides the consumers, with fresh, tasty, and reliable food while regarding natural life cycle systems.

Chhetri (2015) in his study on Empowering Farmers through Organic Farming in the Himalayan State of Sikkim and stated - To teach the farmers to be self-sufficient through organic agriculture and biodiversity conservation, There is a need of a network for distribution with membership of the farmers in it which will buy the produce from their member farmers and There is a large need for improved infrastructure; roads, electricity, and water, in addition to better education and healthcare are the important to empower small farmers in Sikim.

Chettri (2015) studied Organic Farming in Sikkim: Implication for livelihood diversification and community development and concluded that there are substantial changes in socio-economic profile of the cultivators after adopting such type of farming technique.

Siddiqui and Hamid (2015) studied Organic Farming: The Return to Nature and concluded that modern organic farming methods are used to guarantee fertility and pest/ weed control with conventional techniques of crop rotation.

A case study on Organic farming with reference to the Panjab state by Kaur and Renu states that green revolution in the today's scenario is confronted with some major environmental issues, i.e., environmental degradation as portrayed by the qualitative and the quantitative degeneration of all environmental resources such as air, water, land, forests, bio-diversity etc. There emerges the need of a sudden and abrupt change in the agricultural methods and farming practices in the country. The solution to these severe issues lies in adopting sustainable agricultural practices which constitutes organic farming.

Karuppaiyan *et al.,* (2007) studied Organic farming potential in Sikkim, Darjeeling and North eastern hill region of India and concluded that Organic farming became one of the components to bring stability and sustainability to agriculture in this region.

Soumya (2016) studied "organic agriculture in Kerala: an evaluation of certified organic spices products and concluded that the innovative formulations of organic fertilizers are mainly applied by those certified farmers organized under groups.

Barik (2017) in his review article on present status and challenges of Organic farming in India concluded that Organic Practice testify the corresponding GHG mitigation and adaptation potential as reflected in the high carbon sequestration, soil resource regeneration, high energy use efficiency as well as development of plant resilience; but the highlight remains its cost effectiveness and time bound results.

Yadav (2017) studied Towards a healthier Nation: Organic farming and government policies in India and concluded that organic farming sector is one of the most futuristics and

appropriate steps taken by the government to the tap the growth potential of organic crop production in India.

Wani *et al.,* (2017) studied Organic farming: Present status, scope and prospects in Northern India and concluded that Organic Lavender best oil yielding and versatile industrial crop and organic Geranium for oil can be cultivated for high export potential.

Azam and Shaheen (2018) found five major factors that affect the adoption of organic farming (economic, social, marketing, cultivation, government policy) in India. The study also observed that marketing and government policy factors were most crucial in influencing all types of farmers irrespective of their educational level. The farmers with more farming experience were more concerned about social factors. Similarly, the farmers using lease farms were found to be concerned about the economic viability of organic farming.

Bhutani *et al.,* (2018) in their review article Organic Farming in India: An Alternative Agriculture System and stated that for the conservation and preservation of environment, a mixed system where both conventional and organic farming is practiced to meet environmental concerns as well as production, is recommended.

Devi *et al*., (2018) studied Organic farming for sustainable agriculture with focus on agricultural extension strategies for motivating farmers towards organic farming and concluded that organic farming is a science based intensive cropping system based on efficient management of resources, soil health, sun energy harvesting and judicious use of natural resources.

Ivan Tsvetkov *et al.,* (2018) reported that it is necessary for organic farmers and organic sector to promote a bold spirit of inclusivity in innovation and strategic planning is imperative.

Kumar (2019) studied Trends of Organic Farming in Indian economy and stated that low education level of farmers, small land holdings, Low yield of organic crops, Low use of organic

inputs, High Cost of organic products, The high cost of the certification process, Lack of marketing quality are main obstacles in development of organic farming in India.

Suryawanshi *et al*., (2019) studied Organic farming in India: An overview and concluded that organic agriculture will be able to maintain a resource balance, avoid over exploitation of resource, conserving soil nutritional quality and s health, and biodiversity.

Antonin Le *et al*., (2020) reported that the international classification of agro system management is based on recognized agro climatic and management indicators it is improve cereal organic breeding.

Buragohain (2020) studied Importance of organic farming in Economy with Special Reference to Sikkim and concluded that Different policies and aid should be initiated and further research should be done and effort in these areas is required, with much depending on the relevance of current research.

Das *et al*., (2020) studied Organic Farming in India: A vision towards a healthy nation and concluded that the organic farming process is more eco-friendly than conventional farming. The popularity of organically grown foods is increasing day by day owing to their nutritional and health benefits. Organic farming also protects the environment and has a greater socio-economic impact on a nation. India is a country that is bestowed with indigenous skills and potentiality for growth in organic agriculture.

Esteban F. Duran *et al*., (2020) concluded that organic agriculture is now emerging as a sustainable alternative to traditional agriculture using environmentally friendly strategies based on plant extract and microbials.

Elayaraja and Vijai (2020) studied Organic farming in India: Benefits and Challenges and concluded that" The phenomenon of "organic agriculture" is the only solution to nurture the land

and to regenerate the soil by going back to our traditional method of farming i.e., free from chemicals, pesticides and fertilizers.

OBJECTIVES OF THE RESEARCH WORK –

Present work is undertaken with the following objectives-

- Comparative study of growth parameters of wheat and groundnut grown in organic farm and conventional farm.
- To observe yield parameters of wheat and groundnut grown in organic farm and conventional farm.
- Effect of organic farming and conventional farming effect on nodulation and oil percentage in groundnut.
- Comparison nutritional values of wheat and groundnut grown in organic farm and conventional farm
- To study and compare physical, chemical and Biological properties of Soil from Organic farm and conventional farm.
- Comparison of Organoleptic characters of produce from Organic and conventional farm and efforts will be made to improve Organoleptic characters.
- Comparison of Net profit from Organic and conventional farming.

MATERIALS AND METHODS-

Study of comparison between Organic and Conventional farming will be carried out in the field by preparing plots of proper size. Two crops i.e., Wheat (2189) and Groundnut (Tag 24) are selected for this study. All the pre sowing operations will be carried out and soil will be made

ready for sowing. Organic farm will be supplied with the organic manure and pesticides while in conventional method regional conventional methods are used. Comparison will be made between two fields in terms of Growth parameters, Yield Parameters, Nutritional values, Soil parameters.

To study growth parameters, randomly selected hundred plants will be used and their mean values will be recorded.

Growth parameters like Height of the plant, length of the root, number of leaves, number of branches, appearance of flower, biomass, and dry weight will be studied and measured manually with the help of measuring scale/numerically.

Yield parameters like number of flowers, number of pods per plant/ number of seeds per head, seed weight, seed size, and yield will be studied. Number of flowers, Number of pods per plant or grains per head, number of seeds per pod will be counted numerically. Seed weight of randomly selected 100 seeds will be measured with the help of electric balance. Seed size will be measured by method described by using Vernier Caliper.

Nutritional values will be estimated by the methods described by AOAC and FAO.

Physical and chemical properties of the soil will be studied before sowing and after harvesting of the crop. The samples will be analyzed by the methods described by FAO, 2008.

All the observations will be recorded in triplicated and mean of the value will be tabulated. The values will be analyzed statistically to find out significance of the result.

SIGNIFICANCE OF THE STUDY

International status: Area under cultivation of organic farming throughout the word is 72.3 million ha in 2019 which is 1.5% of the total area under agricultural. There are about 187 countries in the world promoting organic farming in their nation but farmers are struggling due to poor policy measures, rising input costs and limited market (ASSOCHAM). Australia (35.7 million hectar) ranks first as per as area under cultivation of organic farming is concerned, it is followed by Argentina (3.7 million hectar) and Africa (2.4 million hectar) India ranks first number of producers is concerned (FiBL report, 2021)

National status: Sikkim was declared India's first organic state in 2016 for adopting organic farming in a big way, In India organic farming is in a nascent stage. According to the Union Ministry of Agriculture and Farmers' Welfare about 2.78 million hectare of farmland was under organic cultivation as of March 2020. This is 2% of the net sown area in the country (140.1 million ha).

As discussed earlier although, many lives were saved with the advent of green revolution but it detorioted the environment and created long term effects for present and future generation. The green revolution results in many agricultural problems like unproductive soils, low water level, excessive use of fertilizers and pesticides etc. Thus, under such circumstances sustainable agriculture received importance to find solution and achieve economically and environmentally sound agriculture systems.

This research work will be helpful to find out significance of organic farming over conventional farming scientifically. Though it is accepted by the people's organic produce is superior over the conventional produce but this systematic and scientific study will be helpful to reveal facts regarding the organic farming. It will be helpful to explain affordability of the organic farming and its acceptability by the farmers. This will be also helpful to increase productivity.

YEAR – WISE PLAN OF WORK

First year – During first year reference work will be carried out in relation to the topic and field work for the first year will be carried out to study comparison between organic and conventional farming.

Second Year – In second year all the observation recorded in first year will be statistically analyzed and conclusions will be drawn.

Field work will be carried out for second consecutive year. To confirm conclusions drawn in first year.

Third Year- During third year all the observations will be brought together and conclusions will be drawn Final synopsis will be submitted to the university. Within given time Ph.D. thesis will be submitted to the university.

REFERENCES -

Association of official analytical collaboration international (AOAC) official method 2011.11, chapter no.4.34,4.2.11.

Azam Md Sikandar and Shaheen Musarrat, (2018). Decisional factors driving farmers to adopt organic farming in India: A Cross- sectional study. IBS, Hyderabad, Emerald Insight, IJSE 46,4: 249-281.

Barik A.K., (2017). Organic farming in India: Present status, challenges and technological breakthrough. International journal of Economic plants. 04(04):182-189.

Bhutani Smita, Kahlon Simrit and Monika, (2018). Organic farming in India: An alternative agricultural system. Amity journal of Agribusiness. 3(1): 37-49.

Buragohain Udeshna, (2020). Importance of Organic farming in Economy with special reference to Sikkim. International Journal of Recent technology and Engineering (IJRTE) .8(5):3635-3638.

Chettri Binod; (2015). Organic farming in Sikkim: implication for livelihood diversification and community development. Ph.D. Thesis, Sikkim university, Gangtok.

Chhetri Madan, (2015). Empowering farmers through Organic farming in the Himalayan state of Sikkim. American International journal of research in Humanities, Arts and social sciences.11 (2): 97-101.

Das Suryatapa, Chatterjee Annalakshmi and Tapan Kumar Pal, (2020). Organic Farming in India: a vision towards a healthy nation. Food Quality and Safety. 4: 69-76.

Elayaraja M., Vijai C, (2020). Organic farming in India: Benefits and challenges. European Journal of Molecular and Clinical medicine .7 (11):

FAO, (2008): World Food Security: The Challenges of Climate Change and Bioenergy. http://www.faopacific.ws/Portals/167/publications/Current%20Updates/WFD2008Global Report.pdf

FAO Traditional methods and recent innovation, chapter no.2 method no.2.3

FiBL & IFOAM – Organics International (2021): The World of Organic Agriculture. Frick and Bonn.

Karuppaiyan, R. Avasthe, R. K. and Rahman, H. (2007). Principles and Methods in Organic Plant Breeding and its Applicability for Crop Improvement in Sikkim. In: *Organic Farming Technology in NEH Region (*Munda, G.C., Ghosh, P.K., Das, A., Ngachan, S.V. and Bujarbaruah, K.M. eds.). ICAR Res. Complex for NEH Region, Shillong, pp.465-486.

Kumar Sunil (2019). Trends of organic farming in Indian economy. IJRAR.6 (1):61-67.

Le Guillou G., Scharpé. A (2001) Organic Farming: Guide to Community Zules, European Commission, Luxembourg 28 pp.

Meena R. P., Meena H. P. and Roop Singh Meena (2013). Organic farming: concept and components. Pop. Kheti.1 (4): 5-14.

Pandey J. and Singh A., (2012). Opportunities and constraints in organic farming: An Indian perspective. Journal of Scientific research 56: 47-72.

Suryawanshi Onkar, Bansode Shilpa and Twinkle kumar Sachchan, (2019). Organic farming in India: An overview. JETIR 6(5):64-67.

Wani Sartaj A., Wani Muneeb Ahmad, Sheikh Mehraj, Padder Bilal A. and Chand Subhash; (2017). Organic farming: Present status, scope and prospects in northern India. Journal of Applied and Natural Sciences 9(4): 2272-2279.

Wankhade, V. R., R. C. Verma, B. L. Salvi, N. Jain and Jain, H. K. (2019). Assessment of Engineering Properties of Aonla Stone and Seeds.Int.J.Curr.Microbiol.App.Sci. 8(4): 2415-2423. Doi: https://doi.org/10.20546/ijcmas.2019.804.281

Yadav Manju; (2017) Towards a Healthier Nation: Organic Farming and Government Policies in India. International Journal of Advance Research and Development. 2 (5)153-159.

https://www.ippapublicpolicy.org/file/paper/5cfe0211e7d35.pdf

https://doi:10.3390/agriculture10020041

https://pnas.org/cgi/doi/10.1073/pnas.082121499

https://doi.org/10.1007/s13165-019-00249-3

https://doi.org/10.1080/13102818.2018.1427509

Dr. Mukundraj B. Patil
(Research Supervisor)

Shailaja B. Bhosale
(Research scholar)